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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/196,683	11/20/1998	SEIJI MIZUNO	2013/14	9431

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1500 K Street, N. W.
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Washington, DC 20005

EXAMINER

CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 09/30/2003

28

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/196,683

Applicant(s)

MIZUNO, SEIJI

Examiner

Jonathan S. Crepeau

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-12 and 17-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-12 and 17-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1, 4-12, and 17-19. The claims are newly rejected under 35 USC §103, as necessitated by amendment. Accordingly, this action is made final.

Claim Rejections - 35 USC §103

2. Claims 8-12, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 9-199145 in view of JP 7-249417 in view of Chow et al (U.S. Patent 5,284,718) in view of Pereira et al (U.S. Patent 6,044,842).

Regarding claims 8, 18, and 19, JP '145 is directed to a fuel cell stack wherein each fuel cell comprises a polymer electrolyte membrane (21) and separators (24, 25) containing gas flow channels (see Fig. 1; paragraph 5 of the machine translation). The membranes are directly bonded to the separators with a layer of adhesive (29) (see Fig. 2). Regarding claims 8, 10, 18, and 19, the separators are made of dense, gas-impermeable carbon and are arranged across gas diffusion electrodes (22, 23) (see Fig. 1; paragraph 40). Regarding claim 11, the adhesive comprises an "epoxy system" resin (see paragraph 46).

JP '145 does not expressly teach that the adhesive has a durometer A hardness of not greater than 90 (claims 9 and 19), or a modulus of elasticity of not greater than 10 MPa (claims 8 and 18) after cure. The reference further does not teach that the adhesive comprises a mixture of

epoxy and modified silicone (claim 11), or that the adhesive includes resin beads of a predetermined diameter (claim 12).

JP 7-249417 is also directed a fuel cell stack. An electrolyte film (30) is bonded to a frame (100) by a layer of adhesive (410) (see abstract; Figure 1). The frame is bonded to a separator (200) by another adhesive (420). The adhesive 420 may comprise a mixture of epoxy resin and denatured (i.e., “modified”) silicone (see paragraph 34). Spherical spacer beads (60) made of polystyrene are mixed with the adhesive 410 (see paragraph 24).

In column 2, line 63 et seq., Chow et al. teach that the use of sealing material between a polymer electrolyte membrane and an electrically conductive plate is known, and that the sealant material deteriorates because it is “not sufficiently resilient to withstand compressive forces over time.”

In column 3, lines 1, 2, and 44-59, Pereira et al. disclose an adapter member (20) comprising a “resilient, thermoplastic elastomer” (e.g., silicone) having a durometer A hardness of approximately 50-80, preferably 50-70. Furthermore, the reference teaches that durometer hardness measurements “generally correlate to the elastic modulus or resiliency of rubber compounds under conditions of relatively small strain.”

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the epoxy/modified silicone adhesive mixture of JP ‘417 as the adhesive of JP ‘145. As noted above, the disclosure of JP ‘417 indicates that such an epoxy/modified silicone adhesive is a suitable composition for sealing the components of fuel cells. The selection of a known material

based on its suitability for its intended use has been held to be *prima facie* obvious (MPEP §2144.07). Thus, the composition recited in claim 11 would be rendered obvious to a skilled artisan.

Additionally, the artisan would be motivated by the disclosure of Chow et al. to make the seals of JP '145 as resilient (elastic) as possible, in hopes of reducing the deterioration of the seals over time. Furthermore, according to the disclosure of Pereira et al., the resiliency, modulus of elasticity, and durometer hardness of a material are generally interrelated quantities (i.e., the durometer hardness and modulus of elasticity are proportional, and both are inversely proportional to the resiliency). As noted above, Chow et al. provides motivation to increase the resiliency of the seals of JP '145, thereby providing motivation to use a material having a low durometer A hardness (i.e., less than 90) and low modulus of elasticity (i.e., less than 10 MPa). As also noted above, Pereira et al. teach a "resilient" material (e.g., silicone) which has a durometer A hardness of 50-80. Accordingly, in view of the teachings of Chow et al. and Pereira et al., the claimed ranges of durometer hardness and elastic modulus in the adhesive of JP '145 would be rendered obvious to a skilled artisan.

Finally, the artisan would be motivated to incorporate the spacer beads (60) of JP '417 into the adhesive layer of JP '145. In paragraph 22, JP '417 teaches that "[t]he electrolyte layer component 150 consists of many spacers 60 which set constant the spacing of the electrolyte layer 30, two electrodes 40, the frame 100 of a couple, and the frame 100 of a couple, and give rigidity, and where the felly section of the electrolyte layer 30 is ****ed with the frame 100 of a couple with many spacers 60, it pastes up with adhesives 410 and is united." Accordingly, the

artisan would be motivated to incorporate the spacer beads of JP '417 into the adhesive layer of JP '145, thereby rendering the subject matter of claim 12 obvious.

3. Claims 1, 4-7 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 9-199145 in view of JP 7-249417 in view of Chow et al. in view of Pereira et al. as applied to claims 8-12, 18, and 19 above, and further in view of Palmer (U.S. Patent 4,804,451).

JP '145 does not expressly teach that the polymer electrolyte has a molar water fraction of less than 4.

The patent of Palmer is generally directed to electrodialysis and electrodeionization apparatuses using ion exchange membranes. In column 1, lines 47-61, the reference teaches that in devices in which membranes are bonded to frames with an adhesive, the bonds are weak because the membrane surfaces are wet.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of Palmer to reduce the water content of the membrane of JP '145 prior to bonding in hopes of improving the sealability of the membrane with the frames. It is noted that JP '145 also recognizes this problem, stating in paragraph 6 that "[u]sually, although such seal nature is easily attained by pasting up using adhesives etc., the fluorine system resin used as a solid-state polyelectrolyte layer has a bad adhesive property over adhesives, and the adhesive property falls

further in a damp or wet condition.” Accordingly, the recitation of a molar water fraction of less than 4 is not considered to patentably distinguish over the references.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

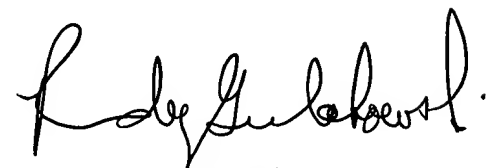
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (703) 308-4333. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 872-9310 (for non-final communications) or (703) 872-9311 (for after-final communications).

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

JSC

September 24, 2003

A handwritten signature in black ink, appearing to read "Randy Gulakowski", is written over a printed nameplate.

RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700